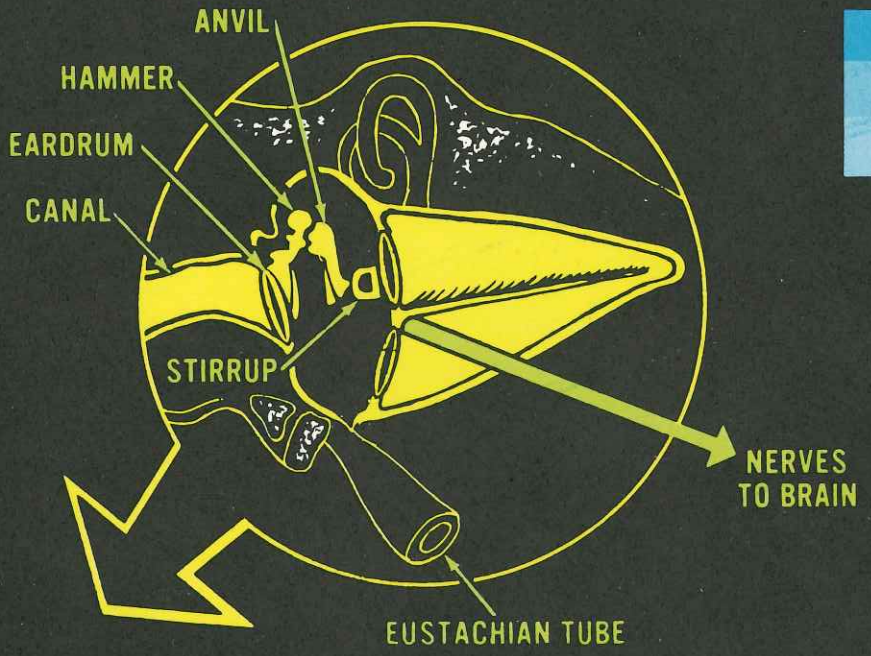
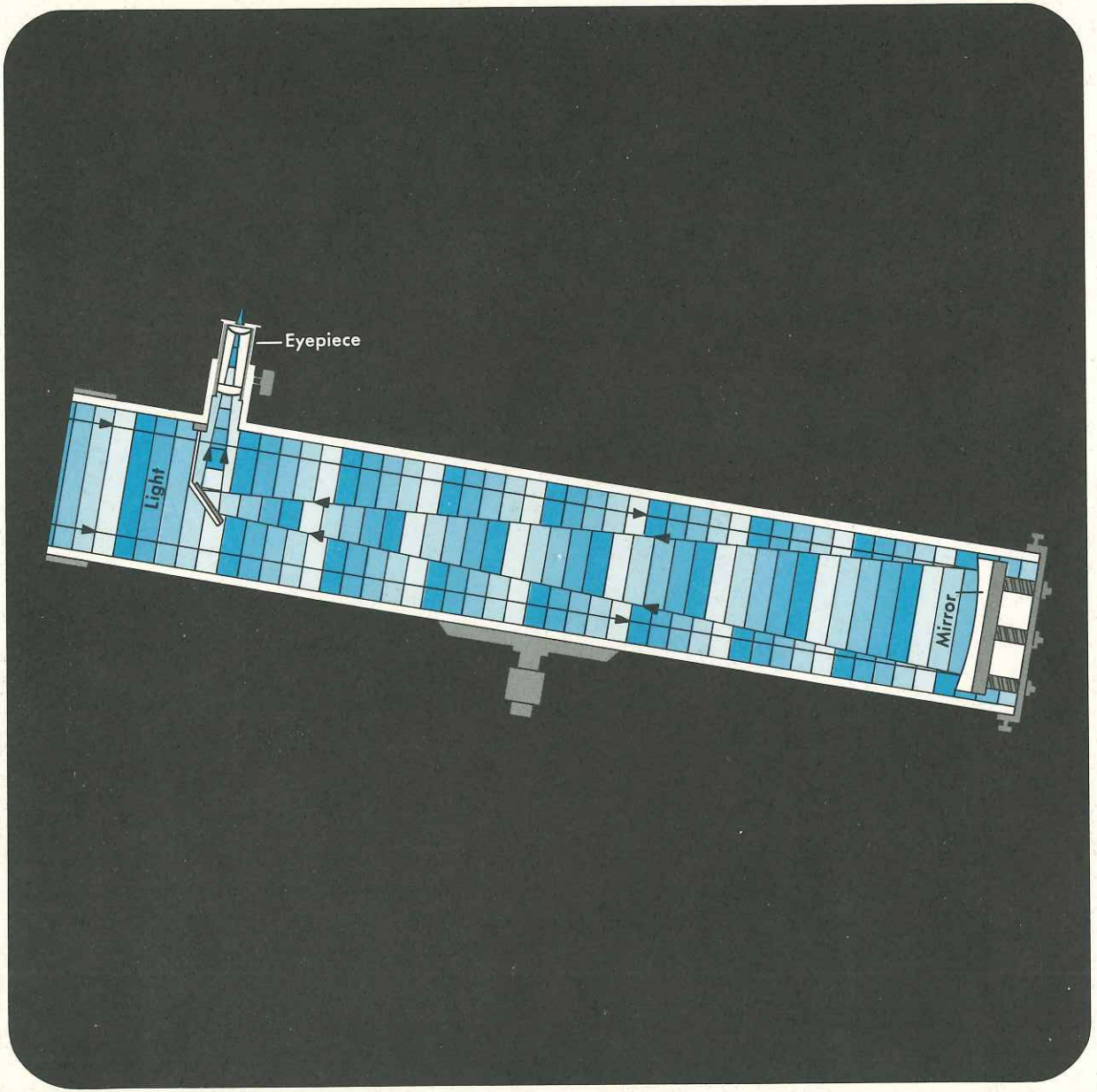
THE HUMAN EAR



STUDENTS WILL LEARN MORE WHEN THEY SEE THIS SLIDE

MOVE

MACMILLAN SCIENCE-LIFE SERIES PRESENTS TECHNAMATION



Can you imagine how clearly students could understand the function of the ear if they could actually see the *movement* of the ear's parts as the sound impulses travel through them to the brain? Now slides showing motion are no longer in the realm of science fiction. The Macmillan Company is proud to present TECHNAMATION –a supplementary teaching aid to THE MACMILLAN SCIENCE-LIFE SERIES.

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WHAT IS TECHNAMATION?

Technamation is a new, simple and inexpensive technique which adds motion to slide projection—motion in any direction, at any speed, and in any combination of directions and speeds. Technamation can reproduce naturally moving elements—it makes liquids stream, gases explode, gears rotate, and electron currents flow. It accomplishes these motion effects without intricate moving parts or the costly sequential still drawings required in conventional animation techniques. Technamation has been developed to animate certain textbook diagrams contained in The Macmillan Science-Life Series.

HOW DOES TECHNAMATION WORK?

The Technamation process effectively utilizes the principle of rotary polarization to achieve motions which are unattainable through any other means practical for classroom visual aids.

As you know, in certain materials such as tourmaline crystals or Polaroid filters, the molecules are arranged in layers. Light may pass through these materials in one plane only—between layers. This light is called polarized light. When little strips of double refracting material are placed on one sheet of plain polarized plastic, and a polarized disk is rotated between the projector and the screen, light is transmitted progressively and motion is simulated.

WHAT DOES TECHNAMATION MEAN TO YOU?

We all know that diagrams are essential for teaching science concepts. For complete understanding, many of the ideas to be developed in science have a quality of motion that must be visualized by the student. A well-written caption and the teacher's discussion will encourage the student to visualize this motion, but much is still left to the student's imagination. Technamation conditions both the teacher and the student to exercise this kind of visualization. This set of selected slides, to be used with The Macmillan Science-Life Series, demonstrates that motion which is an integral part of the understanding of science concepts.

HOW YOU CAN USE TECHNAMATION WITH THE MACMILLAN SCIENCE-LIFE SERIES

The mechanical elements of Technamation consist of a rotating polarizing disk and 2″ x 2″ slides. They can be used with any ordinary slide projector. The electric polarizing disk will run indefinitely without maintenance or repair. You can use your Technamation slides without putting the room in darkness. Thus one slide can demonstrate a particular point during your lecture without lengthy preparation. It can remain in projection for as long a time as you wish.

Technamation, with The Macmillan Science-Life Series, may be used effectively in many ways. Here are several suggestions:

1. To initiate interest and inquiry from the students
2. To develop further understanding of the intricacies of the concepts
3. To reinforce and prove the concepts

The slides may be shown with or without the polarizer in place. When the polarizing disk is placed in front of the projector, the action begins. Students will be encouraged to ask questions calling for interpretations of what is happening.

For example, on the slide shown in the illustration of Series and Parallel Electrical Circuits, students may be motivated to ask such questions as, "What is moving in the wires of the circuits?" "Why is it moving more slowly in the series circuit?" "Why are the lamps yellow in the series circuit and white in the parallel circuit?"

Questions asked during the viewing, those which come from textbook study, and those chosen from the manual by the teacher for class discussion provide an excellent basis for the study and understanding of related science concepts.

Other Technamated Slides are:

SERIES AND PARALLEL ELECTRICAL CIRCUITS, demonstrating the flow of electron current from negative to positive and showing that the current through all parts of a series circuit is the same.

TELEPHONE, demonstrating the transformation of energy into sound waves and how the direct-current electricity flows through the carbon granules when the telephone is in operation.

SOUND REPRODUCTION, picturing a recording, a pickup, a meter showing current, an amplifier and a loudspeaker with the current going through the various stages to produce sound waves.

SIMPLE ELECTRIC MOTOR, demonstrating the switching effect of the commutator by showing that like magnetic poles repel and opposite poles attract one another.

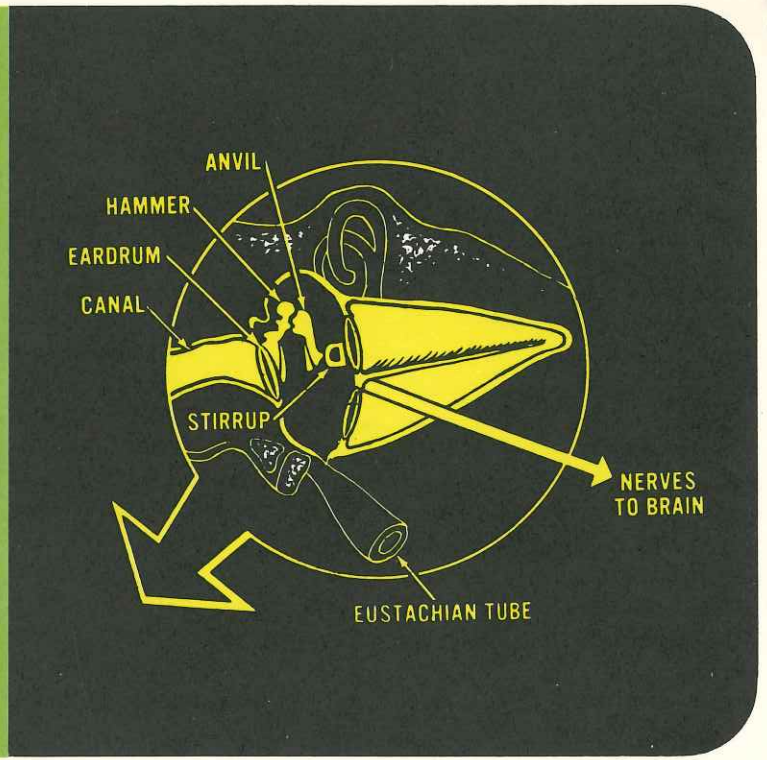
REFLECTING AND REFRACTING TELESCOPES, showing the movement of light within two types of telescopes. (Illustration on opposite page)

GEIGER COUNTER, makes the ionization effect of radioactive decay visual by showing what makes the meter move.

HUMAN HEART, develops a clear understanding of the action and rhythm of the chambers and valves of the heart by showing the flow of the blood through moving parts.

HUMAN EAR, described in detail on back page.

Each section of the Teacher's Manual contains an explanation of the movement, related concepts, discussion questions and a bibliography.



WHAT IS THE TECHNAMATION KIT AND HOW MAY IT BE OBTAINED?

The Technamation kit contains the polarized disk with its base motor and electrical connection, 8 slides which demonstrate concepts in The Macmillan Science-Life Series, and a Teacher's Manual. For each slide the manual contains explanations, discussion notes, study questions, and suggestions for extending science learnings. The kit is designed specifically for use with The Macmillan Science-Life Series; but, of course, Technamation may be used effectively with any science curriculum by upper elementary and secondary teachers.

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THE EAR

Purpose: To show the transfer of sound energy from the outer ear to the inner ear.

Any vibrating object produces condensations and rarefractions (waves) of the gas molecules in the air. Those waves are directed by the outer ear into a canal which enters the head. Just at the end of the canal is the eardrum. This is a thin membrane, like a drumhead, which vibrates when the sound waves strike it. A chain of three tiny bones—the hammer, the anvil and the stirrup—is attached to the eardrum on the inside. The first bone of the chain rests on the eardrum. The end bone of the chain presses against a small curled cochlea in the skull. The tube is filled with fluid. In this slide the cochlea has been uncurled and only a portion of it shows. Nerve endings line the tube and protrude into the fluid. The nerves, which are like long threads, form in bundles and go directly to the brain. The articulation of the three tiny bones is so arranged that the movement of the stirrup magnifies the movement of the eardrum. When the stirrup is moved, the motion is picked up by the fluid in the tube. The liquid stimulates the nerve endings and a message is sent along the nerves to the brain. The brain makes sense out of the message and hearing takes place.